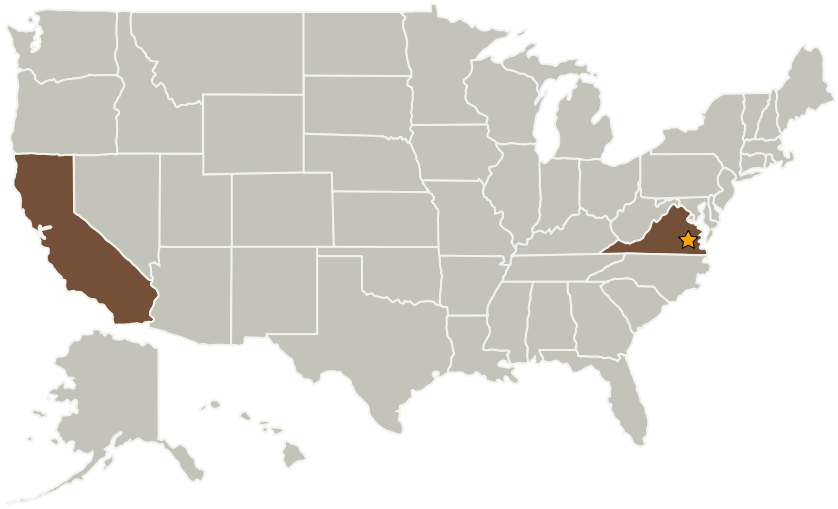
Multifunctional Integrated Optic Sensor for Detection of Cracks and Corrosion, Phase I

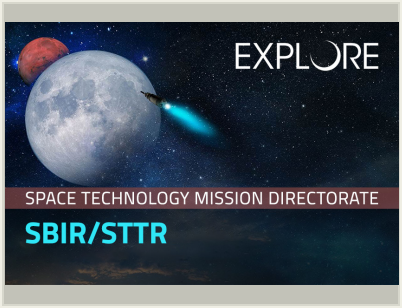
Completed Technology Project (2005 - 2005)

Project Introduction

Los Gatos Research proposes to develop a new nondestructive inspection sensor system, capable of simultaneously measuring strain-based load and detecting crack, corrosion, and disbonding in inaccessible areas of aerospace structures. Our novel sensor technology offers a number of advantages including compactness, lightweight, low power consumption, and high sensitivity. We achieve this by fabricating Bragg gratings on stress-wave-sensitive polymer planar waveguides, which is capable of detecting both surface and below surface cracks and stress in aerospace structures. In Phase I, using a guided wave method we will demonstrate the polymer gratings' capability to measure strain and stress waves indicating the presence and severity of damages caused by cracks, disbonding, or corrosion in a thin metal structure, when the structure is probed by a conventional ultrasonic wave generation device. In Phase II, an integrated optic Bragg grating-based load monitoring and guided wave sensor prototype and a crack detection algorithm will be developed to provide structural health monitoring and nondestructive evaluation for spacecraft composite systems and components.

Primary U.S. Work Locations and Key Partners





Multifunctional Integrated Optic Sensor for Detection of Cracks and Corrosion, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Multifunctional Integrated Optic Sensor for Detection of Cracks and Corrosion, Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Los Gatos Research	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations	
California	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

An-dien L Nguyen

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.5 Nondestructive Evaluation and Sensors